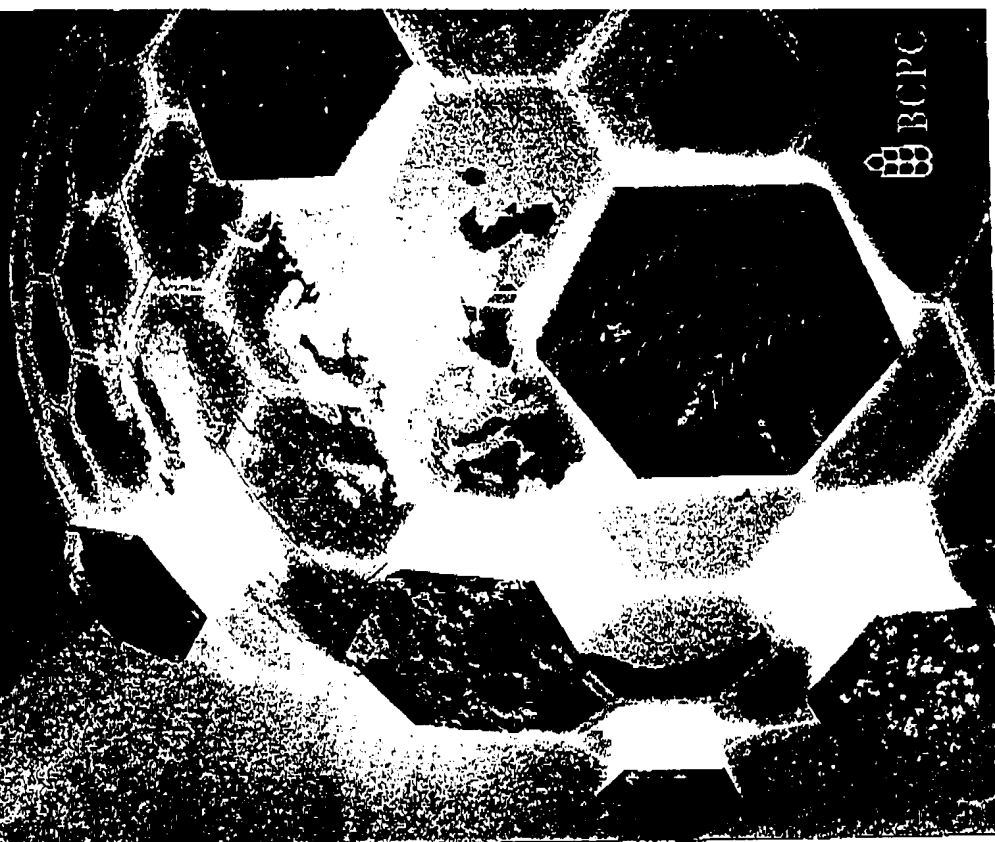


A World Compendium

The Pesticide Manual

Thirteenth Edition

Editor: C D S Tomlin



BCPC

Copyright

© 2003 BCPC (British Crop Protection Council)

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior permission of the copyright owner.

British Library Cataloguing in Publication Data. A catalogue record of this book is available from the British Library.

ISBN 1 901396 13 4

First published	1968	Seventh edition	1983	Thirteenth edition	2003
Second edition	1971	Eighth edition	1987		
Third edition	1972	Ninth edition	1991		
Fourth edition	1974	Tenth edition*	1994		
Fifth edition	1977	Eleventh edition	1997		
Sixth edition	1979	Twelfth edition	2000		

* The tenth edition incorporated *The Agrochemicals Handbook*, previously published by The Royal Society of Chemistry.

Cover design by m360 Nottingham

Typeset and printed by Page Bros., Norwich

Published by: BCPC, 7 Omni Business Centre, Omega Park, Alton, Hampshire, GU34 2QD, UK
Tel +44 (0) 1420 593 200 Fax +44 (0) 1420 593 209

Email: info@bcpc.org Web: www.bcpc.org

All BCPC publications can be bought from: BCPC Publications, 7 Omni Business Centre, Omega Park, Alton, Hampshire, GU34 2QD, UK

Tel +44 (0) 1420 593 200 Fax +44 (0) 1420 593 209

Email: publications@bcpc.org

Or direct from the BCPC Online Book Shop at www.bcpc.org/bookshop

Disclaimer Every effort has been made to ensure that all information in this edition of *The Pesticide Manual* is correct at the time of going to press. However, the editor and the publisher do not accept liability for any error or omission in the content, or for any loss, damage or any other accident arising from the use of the products listed therein.

Before handling, storing or using any approved crop protection product, it is essential to follow the instructions on the label.

Contents

Foreword	v
The Publisher	vii
Preface	ix

Introduction	x
Guide to using the Main Entries, Including Sample Entry	xix
Stereochemistry Nomenclature	xxv
Resistance to Pesticides	

Main Entries	1
--------------	---

Superseded Entries	1039
--------------------	------

Reference	1101
Glossary of Species	1145
Directory of Companies	1175
Abbreviations and Codes	

- 1 Common names - recommended names for ions and radicals
 - 2 GCPF (formerly GIFAP) formulation codes
 - 3 WIPO country codes for patents
 - 4 WHO and EPA toxicity classification
 - 5 IOBC codes for beneficial species
 - 6 EC Classification; Risk symbols and phrases
 - 7 IARC carcinogenicity evidence classifications
 - 8 General abbreviations
- Bibliography

1191

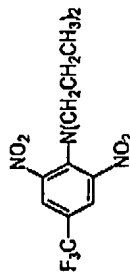
Indexes

1 CAS Registry Numbers	1201
2 Molecular Formulae	1223
3 Code Numbers	1239
4 General Names	1263
5 Classes	1337

ENVIRONMENTAL FATE: Animals Trifluralin labelled in the 2-chlorobenzoyl moiety was metabolised in rats by hydrolytic cleavage, forming metabolites which contained only the 2-chlorophenyl ring and were partly hydroxylated and conjugated. Correspondingly, in experiments with labelling in the 4-trifluoromethoxyphenyl group, metabolites were found which contained only the 4-trifluoromethoxyphenyl ring, partly in hydroxylated form. Plants Following spray application to apples, soya beans and potatoes, trifluralin is only slightly metabolised; metabolites were the same as those formed in animals. For residue analyses, it is sufficient to determine the parent compound in the harvested crops. **Soil/Environment Degradation:** In laboratory tests, trifluralin was moderately quickly degraded in the soil; degradation in the field was more rapid by a factor of 3-5. Repeated applications over 3 years to soil without vegetation did not result in any accumulation in the soil. In practice-relevant applications in forests, the concentrations of residues found in the soil were very low at all times, and declined below the limit of detection after a few months. **Metabolism:** In soil, 50% of applied trifluralin labelled in the 2-chlorobenzoyl moiety was degraded to CO₂ within 112 days and c. 20% of the radioactivity was bound to the soil. When using trifluralin labelled in the 4-trifluoromethoxyphenyl moiety, the compound was mineralised more slowly, while the percentage of bound residues was markedly increased. Metabolism was mainly induced by microbes, and resulted in metabolites which contained just one of the two rings in each case.

836 trifluralin

HRAC K₁ WSSA 3; dinitroaniline



Herbicide

NOMENCLATURE: Common name trifluralin (BSI, E-ISO, ANSI, WSSA, JMAP); trifluraline ((I) F-ISO)

IUPAC name α,α,α -trifluoro-2,6-dinitro-N,N-dipropyl-p-toluidine

Chemical Abstracts name 2,6-dinitro-N,N-dipropyl-4-(trifluoromethyl)benzenamine

CAS RN [1582-09-8] EC no. 216-428-8 Development codes L-35 352 (DowElanco); EL-152 (Lilly)

PHYSICAL CHEMISTRY: Mol. wt. 335.3 M.L. C₁₃H₁₄F₃N₃O₄ Form Yellow-orange crystals. M.p. 48.5-49°C (tech., 43-47.5°C) B.p. 96-97°C/24 Pa V.p. 6.1 mPa (25°C) (EEC A4) $K_{ow} \log P = 4.83$ (20°C) (EEC A6) Henry 15 Pa m³ mol⁻¹ (calc.) S.g./density 1.36 (22°C) (EEC A3) Solubility in water 0.184 (pH 5), 0.221 (pH 7), 0.189 (pH 9) (all in mg/l) (EEC A6); tech. 0.343 (pH 5), 0.395 (pH 9), 0.383 (pH 9) (all in mg/l) (EEC A6). In acetone, chloroform, acetonitrile, toluene, ethyl acetate >1000, methanol 33-40, hexane 50-67 (all in g/l, 25°C). Stability Stable at 52°C (highest storage temperature tested). Stable to hydrolysis at pH 3, 6 and 9 (52°C). Decomposed by u.v. irradiation (E. Leitis & D. G. Crosby, J. Agric. Food Chem., 1974, 22, 840). F.p. 151°C (closed cup); tech. 153°C (open cup) (both Pankty-Martens)

COMMERCIALISATION: History Herbicide reported by E. F. Alder et al. (Proc. North Cent. Weed

1012 trifluralin

Control Conf., 1960, p. 23). Introduced in USA (1961) by Eli Lilly & Co. (agrochemical interests now Dow AgroSciences). Patents US 3257190 (Norton Agrochem; Alnor, Budapest Chemical; Danes; Drezel; Mulheshim-Agan; Milenit; Norton Mulam Ltd; Oxon; Q.E.A.C.A.; Westrade

APPLICATIONS: Biochemistry Microtubule assembly inhibition. Mode of action Selective soil-herbicide, which acts by entering the seedling in the hypocotyl region. Also inhibits root development. Uses Pre-emergence control of many annual grasses and broad-leaved weeds in brassicas, beans, peas, carrots, parsnips, lettuce, caulicums, tomatoes, artichokes, onions, garlic, wheat, strawberries, raspberries, citrus fruit, oilseed rape, peanuts, soya beans, sunflowers, safflowers, ornamentals, cotton, sugar beet, sugar cane, and in forestry. Used with linuron or isoproturon for control of annual grasses and broad-leaved weeds in winter cereals. Normally applied pre-planting with soil incorporation, at 0.5-1.0 kg/ha, but post-planting application is also possible for some crops. Formulation types EC, GR. Selected products Triflan (Dow AgroSciences); Triflan (Dow AgroSciences); 'Elturin' (Eltymidist); 'Herbiflurin' (Vapco); 'Jipexan' (Q.E.A.C.A.); 'Oliore' (Bodapest Chemical); 'Premerlin' (Milenit); 'Sulfuran' (Westrade); 'Tri-4' (BASF); 'Trifluran' (Cequisa); 'Triflurex' (Mulheshim-Agan); 'Tripard' (FCC); 'Trifin' (Griffin); 'Triplen' (Sipcam); 'Zeloxone' (Syngenta Spain); 'matures Team' (3 benfluralin) (Dow AgroSciences); 'Convenience' (+ clomazone) (FMC); 'Cotolina' (+ flumeturon) (Aragro).

ANALYSIS: Product analysis by glc with FID (CIPAC Handbook, 1998, 14, 292; AOAC Methods, 17th Ed., 973.14) or by u.v. spectrometry (ibid., 973.13; CIPAC Handbook, loc. cit.). Residues determined by glc with ECD (J. B. Tepe & R. E. Scroggs Anal. Methods Pestic. Plant Growth Regul. Food Addit., 1967, 5, 522; Anal. Methods Pestic. Plant Growth Regul., 1972, 6, 703). In drinking water by glc with ECD (AOAC Methods, 17th Ed., 990.06). Details from Dow AgroSciences.

MAMMALIAN TOXICOLOGY: IARC ref. 53; class 3 Oral Acute oral LD₅₀ for rats >5000 mg/kg. Skin and eye Acute percutaneous LD₅₀ for rabbits >5000 mg/kg. Non-irritating to skin, slightly irritating to eyes (rabbits). Inhalation LC₅₀ (4 h) for rats >4.8 mg/l. NOEL in 2 y feeding trials in rats, the only effect at the low dose of 813 mg/kg in diet was the formation of renal calculi. This has been shown to be reversible in a 90 d study in dogs, and a NOEL established at 2.4 mg/kg daily. NOEL in mice was 73 mg/kg daily. ADI 0.024 mg/kg. Water GV 20 µg/l (TDI) 7.5 µg/kg b.w.). Toxicity class WHO (4.1) U; EPA (formulation) III, IV EC classification Material containing <0.5 ppm N-nitrosodipropylamine is Xi; R36/ R43/ N; R50, R53

ECOTOXICOLOGY: Birds Acute oral LD₅₀ for bobwhite quail >2000 mg/kg. Dietary LC₅₀ (5 d) for bobwhite quail and mallard ducks >5000 mg/kg. Fish LC₅₀ (96 h) for young rainbow trout 0.088, young bluegill sunfish 0.089 mg/l. Daphnia LC₅₀ (48 h) 0.245 mg/l; NOEC (21 d) 0.051 mg/l. Algae EC₅₀ (7 d) for *Selenastrum capricornutum* 12.1 mg/l; NOEC 5.37 mg/l. Other aquatic spp. LD₅₀ (96 h) for grass shrimps (*Palaemonetes* sp.) 0.64 mg/l. Bees LD₅₀ (oral and contact) >100 µg/bee. Worms LC₅₀ (14 d) >1000 mg/kg dry soil; NOEC (reduced bodyweight) <171 mg/kg.

ENVIRONMENTAL FATE: Animals Degradation in animals is as for soil (J. L. Emmerson & R. C. Anderson, Toxicol. Appl. Pharmacol., 1966, 9, 84-97). Following oral administration, c. 70% is eliminated in the urine and 15% in the faeces within 72 hours. Plants Degradation in plants is as for soil. Soil/Environment Adsorbed by the soil, and is extremely resistant to leaching. Little lateral movement in the soil. Metabolism involves desalkylation of the amino group, reduction of the nitro group to an amino group, partial oxidation of the trifluoromethyl group to a carboxy group, and subsequent degradation to smaller fragments (T. Golab et al., J. Agric. Food Chem., 1979, 27, 163); DT₅₀ 57-126 d. Duration of residual activity in soil is 6-8 mo. In laboratory studies, degradation was more rapid under anaerobic conditions, e.g. for loam soil, DT₅₀ (anaerobic) 25-59 d, DT₅₀ (aerobic) 116-201 d. Soil photolysis DT₅₀ 41 d; aqueous photolysis DT₅₀ 0.8 h.

trifluralin 1013

flamprop-M-isopropyl

Composition Tech. grade is >96% pure. Mol. wt. 363.8. $\text{M.F. C}_{19}\text{H}_{25}\text{ClF}_3\text{NO}_3$. Form White crystals; (tech., off-white crystals). M.p. 72.5–74.5°C. (tech., 70–71°C). V_p 8.5×10^{-2} mPa (25°C). $K_{ow} \log P = 3.69$. S.g./density 1315 kg/m³. Solubility in water 12 mg/l (20°C). In acetone 1560, cyclohexane 677, ethanol 147, hexane 16, xylene c. 500 (all in g/l, 20°C). Stability Stable to light and to heat, and at pH 2–8; DT₅₀ (pH 7) 9140 d. Hydrolysed at pH >8 to flamprop-M and isopropanol. F.p. Non-flammable

flamprop-M-methyl

Composition Tech. grade is >96% pure. Mol. wt. 335.8. $\text{M.F. C}_{17}\text{H}_{15}\text{ClF}_3\text{NO}_3$. Form White to light grey crystals. M.p. 84–86°C. (tech., 81–82°C). V_p 1.0 mPa (20°C). $K_{ow} \log P = 3.0$. S.g./density 1311 kg/l (22°C). Solubility in water 0.016 g/l (25°C). In acetone 406, n-hexane 2.3 (both in g/l, 25°C). Stability Stable to light and to heat, and at pH 2–7. Hydrolysed in alkaline media (pH >7) to parent acid and methanol.

COMMERICALISATION: History Herbicidal properties of the isopropyl ester of the D-acid described by R. H. Scott et al. (Proc. & Crop Prot. Conf. - Weeds, 1976, 2, 723), design discussed by M. A. Venis (Pestic. Sci., 1982, 13, 309) and development by D. Jordan (Spon, 1977, 20, 21). Introduced by Shell Research Ltd (now BASF AG). Patents GB 1437711; GB 1563201 Manufacturers BASF.

APPLICATIONS: Biochemistry Fatty acid synthesis inhibitor. Inhibits cell elongation and cell division, and hence inhibits plant growth. Selectivity depends on differential rates of hydrolysis to the free acid. In tolerant plants, the acid is further de-toxified by formation of conjugates. Mode of action Flamprop-M-isopropyl and -M-methyl are selective systemic herbicides, absorbed by the leaves. Undergo hydrolysis to flamprop-M, which is the herbicidally active compound; in sensitive species, this is transported to meristems.

flamprop-M-isopropyl

Uses Post-emergence control of wild oats (*Avena* spp.) in barley and wheat, including those undersown with clover or ryegrass. Also controls *Aloupecurus myosuroides* and *Alopecurus elatius*. Phytotoxicity Some varieties of wheat and barley may be injured. Formulation types EC. Compatibility Antagonism with broad-leaved herbicides can be expected. Selected products 'Suffix BW' (BASF).

flamprop-M-methyl

Uses Post-emergence control of wild oats (*Avena* spp.) in wheat, including crops undersown with clover or grass. Also controls *Aloupecurus myosuroides*. Phytotoxicity Non-phytotoxic to all spring and winter varieties of wheat. Formulation types EC. Compatibility Miscible with fungicides, chloromequat chloride and foliar nutrients. If applied together with phenoxy herbicides, the activity of flamprop-M-methyl may be reduced. Selected products 'Halaven L' (BASF).

ANALYSIS: Product analysis for esters is by optical rotation and g.c. Residues determined by g.c. with ECD. Details available from BASF.

MAMMALIAN TOXICOLOGY: flamprop-M

Toxicity class WHO (a.i.) U

flamprop-M-isopropyl

Oral Acute oral LD₅₀ for rats and mice >4000 mg/kg. Skin and eye Acute percutaneous LD₅₀ for rats >1600 mg/kg. Not a skin or eye irritant. Inhalation No effect (rats). NOEL in 90 d feeding trials, rats receiving 50 mg/kg diet and dogs receiving 30 mg/kg diet showed no ill-effects. Other Acute i.p. LD₅₀ for rats >1200 mg/kg.

436 flamprop-M

flamprop-M-methyl

Oral Acute oral LD₅₀ for rats 1210, mice 720 mg/kg. Skin and eye Acute percutaneous LD₅₀ for rats >1800 mg/kg (as EC formulation). Non-irritating to skin and eyes. Non-staining to skin. Inhalation No effect (rats). NOEL in 90 d feeding trials, rats receiving 2.5 mg/kg daily and dogs receiving 0.5 mg/kg daily showed no ill-effects. Other Acute i.p. LD₅₀ for rats 350–500 mg/kg.

ECOTOXICOLOGY: flamprop-M-isopropyl

Birds Acute oral LD₅₀ for domestic fowl >2000 mg/kg. Fish LC₅₀ (96 h) for rainbow trout 2.4 mg/L. Daphnia Slightly to moderately toxic. Algae EC₅₀ (96 h) 6.8 mg/L. Other aquatic spp. Moderately toxic to freshwater and marine crustacea. Bees Non-toxic to bees. Worms Non-toxic. Other beneficial spp. Non-toxic to soil arthropods.

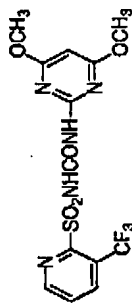
flamprop-M-methyl

Birds Acute oral LD₅₀ for bobwhite quail 4640, pheasants, mallard ducks, domestic fowl, partridges, pigeons all >1000 mg/kg. Fish LC₅₀ (96 h) for rainbow trout 4.0 mg/L. Daphnia Slightly to moderately toxic. Algae EC₅₀ (96 h) 5.1 mg/L. Other aquatic spp. Moderately toxic to freshwater and marine crustacea. Bees Non-toxic to bees. Worms Non-toxic. Other beneficial spp. Non-toxic to soil arthropods.

ENVIRONMENTAL FATE: Animals In mammals, following oral administration of flamprop-M-methyl or flamprop-M-isopropyl, complete metabolism and excretion occurs within 4 days. Plants In plants, flamprop-M-methyl and flamprop-M-isopropyl are hydrolysed to the biologically active flamprop acid, which then undergoes conversion to a biologically inactive conjugate. Soil/Environment The major soil degradate from both esters is flamprop free acid.

356 flazasulfuron

HRAC B WSSA 2: sulfonyleurea



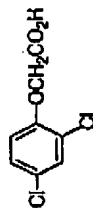
NOMENCLATURE: Common name flazasulfuron (BSI, draft E-ISO)

IUPAC name 1-(4,6-dimethoxypyrimidin-2-yl)-3-(3-(trifluoromethyl)-2-pyridyl)sulfonylurea
Chemical Abstracts name N-[(4,6-dimethoxy-2-pyrimidinylamino)carbonyl]-3-(trifluoromethyl)-2-pyridinesulfonamide
CAS RN [104040-76-0] Development codes SL-160 (Shihara Sangro)

PHYSICAL CHEMISTRY: Mol. wt. 407.3. $\text{M.F. C}_{17}\text{H}_{15}\text{F}_3\text{N}_5\text{O}_5$. Form Odourless, white crystalline powder. M.p. 180°C (purity 99.7%). V_p <0.013 mPa (25°C, 35°C and 45°C). $K_{ow} \log P = 1.30$ (pH 5); -0.06 (pH 7). Henry <2.58 x 10⁻⁶ Pa m³ mol⁻¹. S.g./density 1.606 (20°C). Solubility In water 2.1 g/l (pH 7, 25°C). In octanol 0.2, methanol 4.2, acetone 22.7, toluene 0.56, acetonitrile 8.7 (all in g/l, 25°C). In hexane 0.5 mg/l (25°C). Stability DT₅₀ in water 17.4 d (pH 4); 16.6 d (pH 7); 13.1 d (pH 9) (all 22°C). pKa 4.37 (20°C). F.p. Non-flammable

flazasulfuron 437

HRAC O WSSA 4; phenoxyacetic acid



NOMENCLATURE: 2,4-D

Common name 2,4-D (BSI, E-ISO, (m) F-ISO, WSSA); 2,4-PA (MAF)

IUPAC name (2,4-dichlorophenoxy)acetic acid

Chemical Abstracts name (2,4-dichlorophenoxy)acetic acid

CAS RN [94-75-7] EC no. 202-361-1 Development codes L208 (Marks)

2,4-D-butyl

IUPAC name 2-butoxyethyl (2,4-dichlorophenoxy)acetate

CAS RN [1929-73-3] EC no. 217-680-1

2,4-D-butyl

IUPAC name butyl (2,4-dichlorophenoxy)acetate

CAS RN [94-80-4] EC no. 202-364-8

2,4-D-dimethylammonium

IUPAC name dimethylammonium (2,4-dichlorophenoxy)acetate

CAS RN [2008-39-1] EC no. 217-915-8

2,4-D-diamine

IUPAC name bis(2-hydroxyethyl)ammonium (2,4-dichlorophenoxy)acetate

CAS RN [5742-19-8] EC no. 227-256-8

2,4-D-ethyl

IUPAC name ethyl (2,4-dichlorophenoxy)acetate

2,4-D-2-ethylhexyl

IUPAC name 2-ethylhexyl (2,4-dichlorophenoxy)acetate

CAS RN [1928-43-4] EC no. 217-673-3 Development codes N208 (Marks)

2,4-D-isobutyl

IUPAC name 2-methylpropyl (2,4-dichlorophenoxy)acetate

CAS RN [1713-15-1] EC no. 216-992-5

2,4-D-isocyl

IUPAC name octyl (2,4-dichlorophenoxy)acetate (mixed octyl isomers)

CAS RN [25168-26-7], formerly [1280-20-2] EC no. 246-704-3

2,4-D-isopropyl

IUPAC name isopropyl (2,4-dichlorophenoxy)acetate

CAS RN [94-11-1] EC no. 202-305-6

2,4-D-sodium

IUPAC name sodium (2,4-dichlorophenoxy)acetate

CAS RN [2702-72-9] EC no. 220-290-4

254 2,4-D

2,4-D-isolamine

IUPAC name tris(2-hydroxyethyl)ammonium (2,4-dichlorophenoxy)acetate

CAS RN [2569-01-9] EC no. 219-911-1

PHYSICAL CHEMISTRY: 2,4-D

Composition Tech. is >96% pure. Mol. wt. 221.0 M.f. C₁₂H₁₀Cl₂O₃ Form Colourless powder, with a slight phenolic odour. M.p. 140.5°C V.p. 1.86 x 10⁻² mPa (25°C) [OECD 104]

K_{ow} logP = 2.58-2.83 (pH 1), 0.04-0.33 (pH 5) Henry 1.32 x 10⁻⁵ Pa m³ mol⁻¹ (calc.)

S.g./density 1.508 (20°C) Solubility in water 311 (pH 1), 20031 (pH 5), 23 180 (pH 7),

34 196 (pH 9) (all in mg/l, 25°C). In ethanol 1250, diethyl ether 243, heptane 1.1, volume 6.7,

xylene 3.8 (all in g/kg, 20°C); in octanol 120 g/l (25°C). Insoluble in petroleum oils.

Mono-n-butyrate salt in water 18 g/l (30°C). Stability 2,4-D is a strong acid, and forms water-

soluble salts with alkali nixes and amines. Hard water leads to precipitation of the calcium and

magnesium salts, but a sequestering agent is included in formulations to prevent this. Photolytic

DT₅₀ (simulated sunlight) 7.5 d. pKa 2.73

2,4-D-butyl

Mol. wt. 321.2 M.f. C₁₄H₁₈Cl₂O₄

2,4-D-butyl

Mol. wt. 277.1 M.f. C₁₂H₁₄Cl₂O₃

2,4-D-dimethylammonium

Mol. wt. 266.1 M.f. C₁₂H₁₃Cl₂NO₃ M.p. decomp. c. 120°C. Solubility in water 3 kg/l (20°C).

Soluble in alcohols and acetone. Insoluble in kerosene and diesel oil.

2,4-D-diolamine

Mol. wt. 326.2 M.f. C₁₂H₁₇Cl₂NO₃

2,4-D-ethyl

Mol. wt. 249.1 M.f. C₁₀H₁₂Cl₂O₃

2,4-D-2-ethylhexyl

Composition Isomeric with 2,4-D-isocyl; sometimes these names are used interchangeably.

Mol. wt. 333.3 M.f. C₁₄H₂₂Cl₂O₃ Form Golden yellow, non-viscous liquid, with a sweet, slightly

plumewy odour. M.p. <-37°C B.p. >300°C (decomp.) V.p. 47.9 mPa (25°C)

K_{ow} logP = 5.78 (25°C) Henry 1.8 Pa m³ mol⁻¹ (calc.) S.g./density 1.146 (20°C)

Solubility in water 0.086 mg/l (25°C). Miscible with most organic solvents. Stability Hydrolysis

DT₅₀ <1 h. Stable to light, DT₅₀ >100 d. Stable at 54°C. E.p. 171°C (Cleveland open cup)

2,4-D-isobutyl

Mol. wt. 277.1 M.f. C₁₂H₁₄Cl₂O₃

2,4-D-isocyl

Composition Isomeric with 2,4-D-2-ethylhexyl; sometimes these names are used interchangeably.

Mol. wt. 333.3 M.f. C₁₄H₂₂Cl₂O₃ Form Yellowish-brown liquid, with a phenolic odour.

B.p. 317°C S.g./density 1.14-1.17 g/ml (20°C) Solubility in water 10 mg/l. E.p. 171°C

2,4-D-isopropyl

Mol. wt. 263.1 M.f. C₁₁H₁₂Cl₂O₃ Form Colourless liquid. M.p. 5-10°C and 20-25°C (two

forms) B.p. 130°C/1 mmHg V.p. 1.4 Pa (25°C) Solubility Practically insoluble in water. Soluble

in alcohols and most oils.

2,4-D-sodium

Mol. wt. 243.0 M.f. C₈H₅Cl₂NaO₃ Solubility in water 18 g/l (20°C).